UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,883	01/08/2002	G. William Walster	SUN-P6432-SPL	5601

22835 7590 04/22/2005	EXAMINER
A. RICHARD PARK, REG. NO. 41241 PARK, VAUGHAN & FLEMING LLP 2820 FIFTH STREET DAVIS, CA 95616	DO, CHAT C

ART UNIT	PAPER NUMBER
2193	

DATE MAILED: 04/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<table>
<tr>
<td rowspan="2">Office Action Summary</td>
<td colspan="2">Application No.</td>
<td>Applicant(s)</td>
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<tr>
<td colspan="2">10/042,883</td>
<td>WALSTER ET AL.</td>
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<td>Examiner</td>
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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *1/8/02 and 2/13/02 and 6/7/04; 10/12/04*.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-51* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *07 May 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date *6/7/04; 10/12/04*.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1.   Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

2.   The abstract of the disclosure is objected to because the abstract is written exceeding 150 words in length. Correction is required. See MPEP § 608.01(b).

3.   The disclosure is objected to because of the following informalities:

The applicant is advised to update information cited in related application section in page 1 of specification.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

4.   35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5.   Claims 1-51 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-17 clearly recite a method for solving a global inequality constrained

optimization problem according to a mathematic algorithm. Claims 18-34 recite a

computer-readable storage medium storing instructions that executing the above method

but fail to limit the medium to any particular solid tangible medium. Claims 35-51 recite

an apparatus implementing the above method but fail to limit the apparatus to any

particular structure other than a general computer with input, memory, and processing

devices. Indeed, any apparatus used to implementing the underlined process would result

in an apparatus as claimed. In order for such a claimed method, computer-readable

medium, or a claimed non-specified apparatus implementing the underlined process to be

statutory, the claims must include either a step or means that results in a physical

transformation outside the computer, a solid tangible medium, or a limitation to a

practical application respectively. However, it is clear from the claims that the claims

merely recite step or non-specific means for data computation and manipulation in

performing a mathematical function or medium including non-tangible medium as cited

in specification page 11 lines 1-5. The input is a set of number and output is also a set of

number. The claims fail to recite any step or means that results in a physical

transformation outside the computer, that includes a limitation to a practical application,

that requires tangible medium only for storing, or that requires a specific computer to

implement the claimed process. Therefore, claims 1-51 are clearly directed to a non-

statutory subject matter.

Claim Rejections - 35 USC § 102

6.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7.   Claims 1-15, 18-32, and 35-49 are rejected under 35 U.S.C. 102(b) as being anticipated

by Eldon ("Global Optimization Using Interval Analysis").

Re claim 1, Eldon discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a method for using a computer system to solve a global

inequality constrained optimization problem (e.g. Preface section and page VI lines 15-20

and 25-30) specified by a function f (e.g. page 167 line 10) and a set of inequality

constraints $p_i(x) <= 0$ (i=1, ...,m) (e.g. page 167 line 11), wherein f and p are scalar

functions of a vector x = (xl, x2 x3, ... xn) (e.g. page 168 lines 12-15), the method

comprising: receiving a representation of the function f and the set of inequality

constraints at the computer system (e.g. page 167 lines 10-11); storing the representation

in a memory within the computer system (e.g. inherently under preface section and page

VI lines 15-20 and 25-30); performing (e.g. pages 174-175 under the steps of the

algoirthms) an interval inequality constrained global optimization process to compute

guaranteed bounds on a globally minimum value of the function f(x) subject to the set of

inequality constraints; wherein performing the interval inequality constrained global

optimization process involves, applying term consistency (e.g. steps 1-3 under the steps

of the algorithm) to a set of relations associated with the global inequality constrained

optimization problem over a subbox X (e.g. step 6 under the steps of the algorithm), and

excluding (e.g. step 4 under the steps of the algorithm) any portion of the subbox X that

violates any of these relations, applying box consistency (e.g. steps 6-8 under the

algorithm) to the set of relations associated with the global inequality constrained

optimization problem over the subbox X, and excluding any portion of the subbox X that

violates any of these relations, and performing an interval Newton step (e.g. step 11

under the steps of the algorithm) for the global inequality constrained optimization

problem over the subbox X to produce a resulting subbox Y, wherein the point of

expansion of the interval Newton step is a point x.

Re claim 2, Eldon further discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a step of applying term consistency to the set of relations

involves applying term consistency to the set of inequality constraints $p(x) <= 0$ (i=1,

...,m) over the subbox X (e.g. paragraph under section 11.7).

Re claim 3, Eldon further discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a step of applying box consistency to the set of relations

involves applying box consistency to the set of inequality constraints $p(x) <= 0$ (i=1, ...,m)

over the subbox X (e.g. steps 2-4 under the section 11.7).

Re claim 4, Eldon further discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a step of wherein performing the interval inequality

constrained global optimization process involves, keeping track of a smallest upper

bound f_bar of the function f(x) at a feasible point x, removing from consideration any

subbox X for which $f(X) > f\_bar$; wherein applying term consistency to the set of

relations involves applying term consistency to the f_bar inequality f(x) < f_bar over the

subbox X (e.g. steps 1-6 under the steps of the algorithm).

Re claim 5, Eldon further discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a step of applying box consistency to the set of relations

involves applying box consistency to the f_bar inequality f(x) <= f_bar over the subbox

X (e.g. steps 1-4 under the steps of the algorithm).

Re claim 6, Eldon further discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a step of if the subbox X is strictly feasible (p(X) < 0 for

all i=1, ...,n), performing the interval inequality constrained global optimization process

involves: determining a gradient g(x) of the function f(x), wherein g(x) includes

components g(x) (i=1, ...,p); removing from consideration any subbox for which g(x) is

bounded away from zero, thereby indicating that the subbox does not include an

extremum of f(x); and wherein applying term consistency to the set of relations involves

applying term consistency to each component g,(x)=0 (f=1, ...,n) of g(x)=0 over the

subbox X (e.g. under section 10.5 with Jacobian as gradient of set).

Re claim 7, Eldon further discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a step of applying box consistency to the set of relations

involves applying box consistency to each component g(x)=0 (i=1, ...,n) of g(x)=0 over

the subbox X (e.g. under section 10.5 with Jacobian as gradient of set).

Re claim 8, Eldon further discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a step of if the subbox X is strictly feasible (p(X) < 0 for

all i=1, ...,n), performing the interval inequality constrained global optimization process

involves: determining diagonal elements S(x) (f=1, ...,r4 of the Hessian of the function

f(x); removing from consideration any subbox for which a diagonal element S(X) of the

Hessian over the subbox X is always negative, indicating that the function f(x) not

convex over the subbox X and consequently does not contain a global minimum within

the subbox X; and wherein applying term consistency to the set of relations involves

applying term consistency to each inequality S(x) k 0 (f=1, ...,n) over the subbox X (e.g.

page 172 lines 10-20 under certainly strict feasibility section).

Re claim 9, Eldon further discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a step of applying box consistency to the set of relations

involves applying box consistency to each inequalityH($\overset{.}{x}$) >= 0 (i=1, ...,n) over the

subbox X (e.g. page 172 lines 10-20 under certainly strict feasibility section).

Re claim 10, Eldon further discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a step of if the subbox X is strictly feasible (p,(X) < 0 for

all i=1, ...,n), performing the interval Newton step involves: computing the Jacobian

J(x,X) of the gradient of the function/evaluated with respect to a point x over the subbox

X; and computing an approximate inverse B of the center of J(x,X), using the

approximate inverse B to analytically determine the system Bg(x), wherein gtx) is the

gradient of the function f(x), and wherein g(x) includes components g,(x) (f=1, ..., n) (e.g.

under section 10.5 with Jacobian as gradient of set).

Re claim 11, Eldon further discloses under the section "Inequality-Constrained

Optimization" in page 167-178 a step of applying term consistency to the set of relations

involves applying term consistency to each component (Bg(x)), = 0 (i=1, ...,n) to solve for

the variable x, over the subbox X (e.g. under section 10.5 with Jacobian as gradient of set).

Re claim 12, Eldon further discloses under the section "Inequality-Constrained Optimization" in page 167-178 a step of applying box consistency to the set of relations involves applying box consistency to each component $(Bg(x))j = 0$ çi=l, ...,n) to solve for the variable x over the subbox X (e.g. under section 10.5 with Jacobian as gradient of set and section 11.7).

Re claim 13, Eldon further discloses under the section "Inequality-Constrained Optimization" in page 167-178 a step of performing the interval Newton step involves performing the Newton step on the John conditions (e.g. step 11 in page 175).

Re claim 14, Eldon further discloses under the section "Inequality-Constrained Optimization" in page 167-178 a step of performing the interval inequality constrained global optimization process involves, linearizing the set of inequality constraints to produce a set of linear inequality constraints with interval coefficients that enclose the nonlinear inequality constraints, and preconditioning the set of linear inequality constraints through additive linear combinations to produce a set of preconditioned linear inequality constraints', and wherein applying term consistency to the set of relations involves applying term consistency to the set of preconditioned linear inequality constraints over the subbox X (e.g. section 11.6).

Re claim 15, Eldon further discloses under the section "Inequality-Constrained Optimization" in page 167-178 a step of applying box consistency to the set of relations

involves applying box consistency to the set of preconditioned linear inequality constraints over the subbox X (e.g. section 11.6).

Re claim 18, it is a machine-readable storage medium claim of claim 1. Thus, claim 18 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 19, it is a machine-readable storage medium claim of claim 2. Thus, claim 19 is also rejected under the same rationale as cited in the rejection of rejected claim 2.

Re claim 20, it is a machine-readable storage medium claim of claim 3. Thus, claim 20 is also rejected under the same rationale as cited in the rejection of rejected claim 3.

Re claim 21, it is a machine-readable storage medium claim of claim 4. Thus, claim 21 is also rejected under the same rationale as cited in the rejection of rejected claim 4.

Re claim 22, it is a machine-readable storage medium claim of claim 5. Thus, claim 22 is also rejected under the same rationale as cited in the rejection of rejected claim 5.

Re claim 23, it is a machine-readable storage medium claim of claim 6. Thus, claim 23 is also rejected under the same rationale as cited in the rejection of rejected claim 6.

Re claim 24, it is a machine-readable storage medium claim of claim 7. Thus, claim 24 is also rejected under the same rationale as cited in the rejection of rejected claim 7.

Re claim 25, it is a machine-readable storage medium claim of claim 8. Thus, claim 25 is also rejected under the same rationale as cited in the rejection of rejected claim 8.

Re claim 26, it is a machine-readable storage medium claim of claim 9. Thus, claim 26 is also rejected under the same rationale as cited in the rejection of rejected claim 9.

Re claim 27, it is a machine-readable storage medium claim of claim 10. Thus, claim 27 is also rejected under the same rationale as cited in the rejection of rejected claim 10.

Re claim 28, it is a machine-readable storage medium claim of claim 11. Thus, claim 28 is also rejected under the same rationale as cited in the rejection of rejected claim 11.

Re claim 29, it is a machine-readable storage medium claim of claim 12. Thus, claim 29 is also rejected under the same rationale as cited in the rejection of rejected claim 12.

Re claim 30, it is a machine-readable storage medium claim of claim 13. Thus, claim 30 is also rejected under the same rationale as cited in the rejection of rejected claim 13.

Re claim 31, it is a machine-readable storage medium claim of claim 14. Thus, claim 31 is also rejected under the same rationale as cited in the rejection of rejected claim 14.

Re claim 32, it is a machine-readable storage medium claim of claim 15. Thus, claim 32 is also rejected under the same rationale as cited in the rejection of rejected claim 15.

Re claim 35, it is an apparatus claim of claim 1. Thus, claim 35 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 36, it is an apparatus claim of claim 2. Thus, claim 36 is also rejected under the same rationale as cited in the rejection of rejected claim 2.

Re claim 37, it is an apparatus claim of claim 3. Thus, claim 37 is also rejected under the same rationale as cited in the rejection of rejected claim 3.

Re claim 38, it is an apparatus claim of claim 4. Thus, claim 38 is also rejected under the same rationale as cited in the rejection of rejected claim 4.

Re claim 39, it is an apparatus claim of claim 5. Thus, claim 39 is also rejected under the same rationale as cited in the rejection of rejected claim 5.

Re claim 40, it is an apparatus claim of claim 6. Thus, claim 40 is also rejected under the same rationale as cited in the rejection of rejected claim 6.

Re claim 41, it is an apparatus claim of claim 7. Thus, claim 41 is also rejected under the same rationale as cited in the rejection of rejected claim 7.

Re claim 42, it is an apparatus claim of claim 8. Thus, claim 42 is also rejected under the same rationale as cited in the rejection of rejected claim 8.

Re claim 43, it is an apparatus claim of claim 9. Thus, claim 43 is also rejected under the same rationale as cited in the rejection of rejected claim 9.

Re claim 44, it is an apparatus claim of claim 10. Thus, claim 44 is also rejected under the same rationale as cited in the rejection of rejected claim 10.

Re claim 45, it is an apparatus claim of claim 11. Thus, claim 45 is also rejected under the same rationale as cited in the rejection of rejected claim 11.

Re claim 46, it is an apparatus claim of claim 12. Thus, claim 46 is also rejected under the same rationale as cited in the rejection of rejected claim 12.

Re claim 47, it is an apparatus claim of claim 13. Thus, claim 47 is also rejected under the same rationale as cited in the rejection of rejected claim 13.

Re claim 48, it is an apparatus claim of claim 14. Thus, claim 48 is also rejected under the same rationale as cited in the rejection of rejected claim 14.

Re claim 49, it is an apparatus claim of claim 15. Thus, claim 49 is also rejected under the same rationale as cited in the rejection of rejected claim 15.

Double Patenting

8.   The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9.   Claims 1-5, 10, 13-14, 18-22, 27, 30-31, 35-39, 44, and 47-48 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5, 11, 8-9, 12-16, 22, 19-20, 23-27, 33, and 30-31 respectively of copending Application No. 10/042,883. Although the conflicting claims are not identical, they are not patentably distinct from each other because the same method, medium, and apparatus would be used to apply for both sets of equality and inequality constraints.

This is a _provisional_ obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

10.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a.   U.S. Patent Application Publication No. US 2002/0183987 to Chiang discloses a dynamical method for obtaining global optimal solution of general nonlinear programming problems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chat C. Do whose telephone number is (571) 272-3721. The examiner can normally be reached on M => F from 7:00 AM to 5:30 PM.
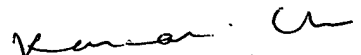
If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Chaki Kakali can be reached on (571) 272-3719. The fax phone number for the

organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chat C. Do
Examiner
Art Unit 2193

April 11, 2005

KAKALI CHAKI
PATENT EXAMINER
TER 2100